Insertable Pixels Progress Report

February 19, 2001

Pixel General Meeting

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Pixel Detector

Overview

- **Synopsis of events since September**
  - Tube envelope Shrank from ~r250 to r242
    - All disks now have 8-sectors, and are identical
    - 2% coverage hole–depends on definition of hole, but not hermetic
  - SCT envelope grew–Forward modules cut back 13mm radially
    - SCT envelope is now well defined, and is what allows Support Tube design to work
  - Design effort at RAL–ground work for rail/tube design and mockup
- **Layout of support scheme and new services**
  - Installation requires new support scheme
  - Implies new service routing and breaks
- **Installation overview**
  - Key points and ramifications
- **Mockup of Pixel Support Tube is underway**
  - Verification of installation procedure
  - Testing of support and load transfer
- **Key milestones**

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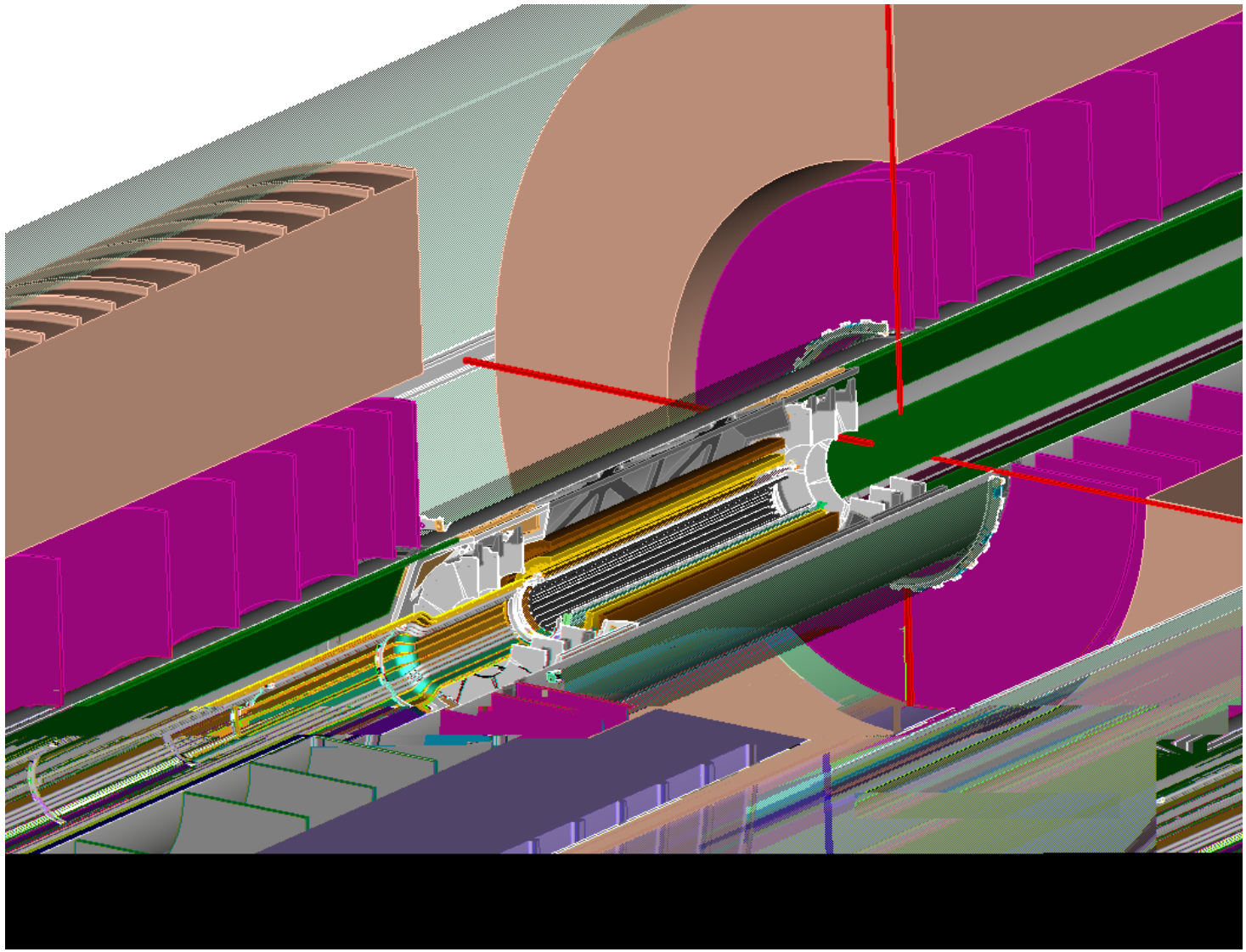
Pixels in Installed position



Beam pipe and Barrel ID not shown for clarity

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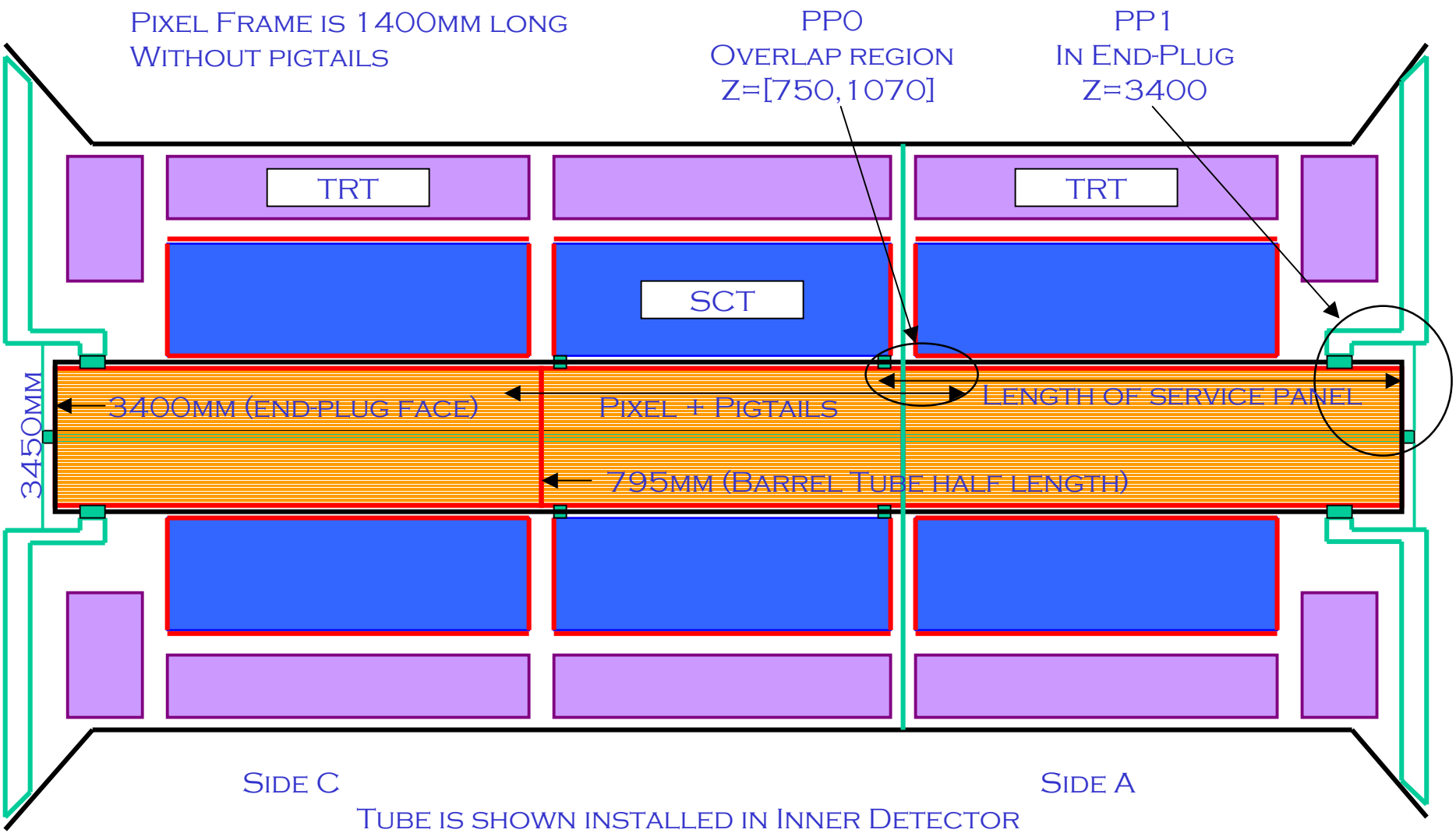
General Layout



Tube is shown installed in Inner Detector

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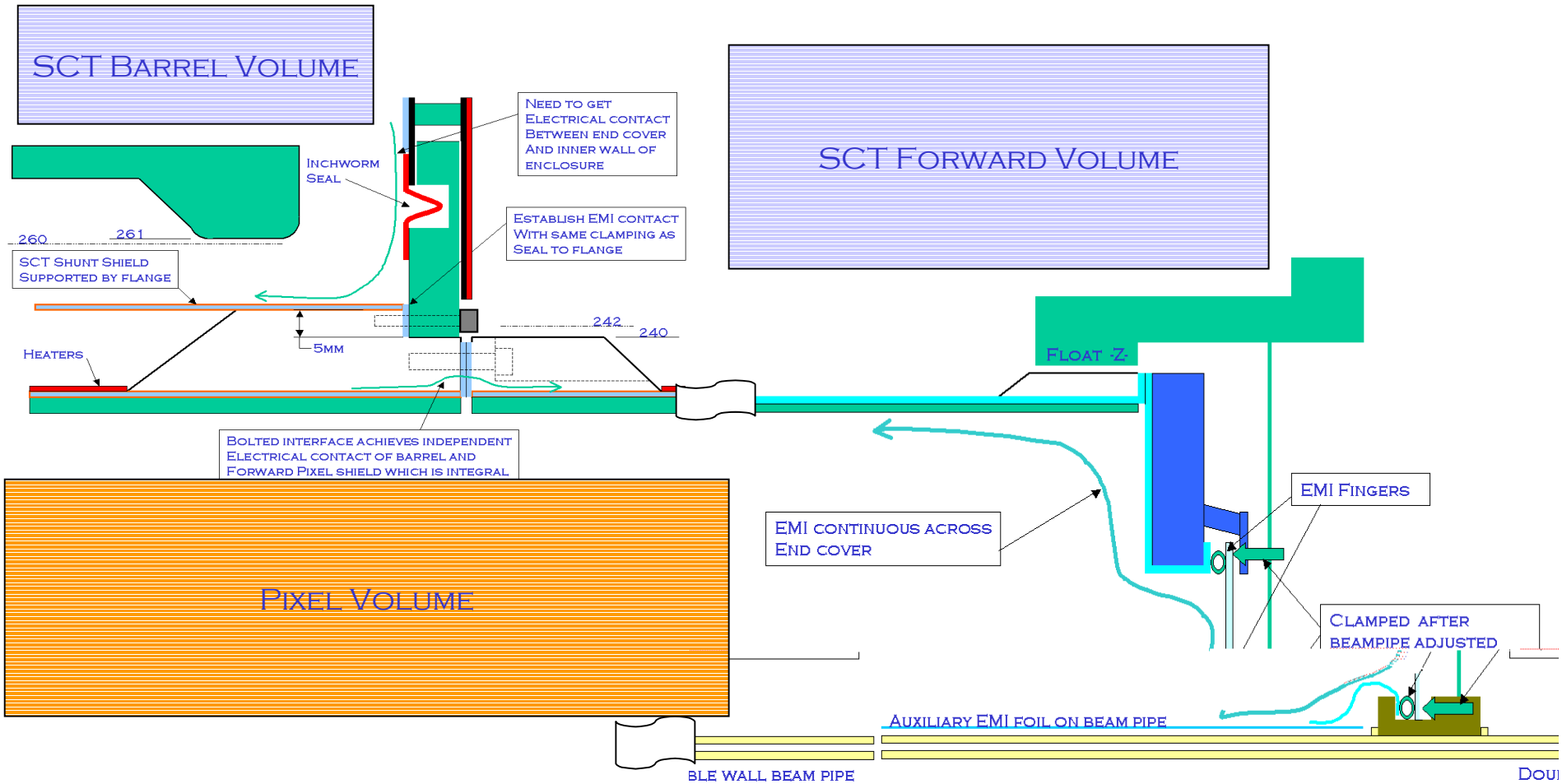
Thermal/EMI/GAS Barrier



- **Pixel Support Tube is supported by both the beam pipe support* and the SCT Barrel (Barrel ID)**
- **It forms a closed volume with the Beam pipe**

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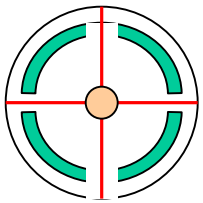
Far Services are inserted

Far Services
in Quadrants



Services need to extend beyond end of Beam pipe support frame to allow termination of overlapping pigtails

Far side pigtails need to fold back over frame to give access to PP0

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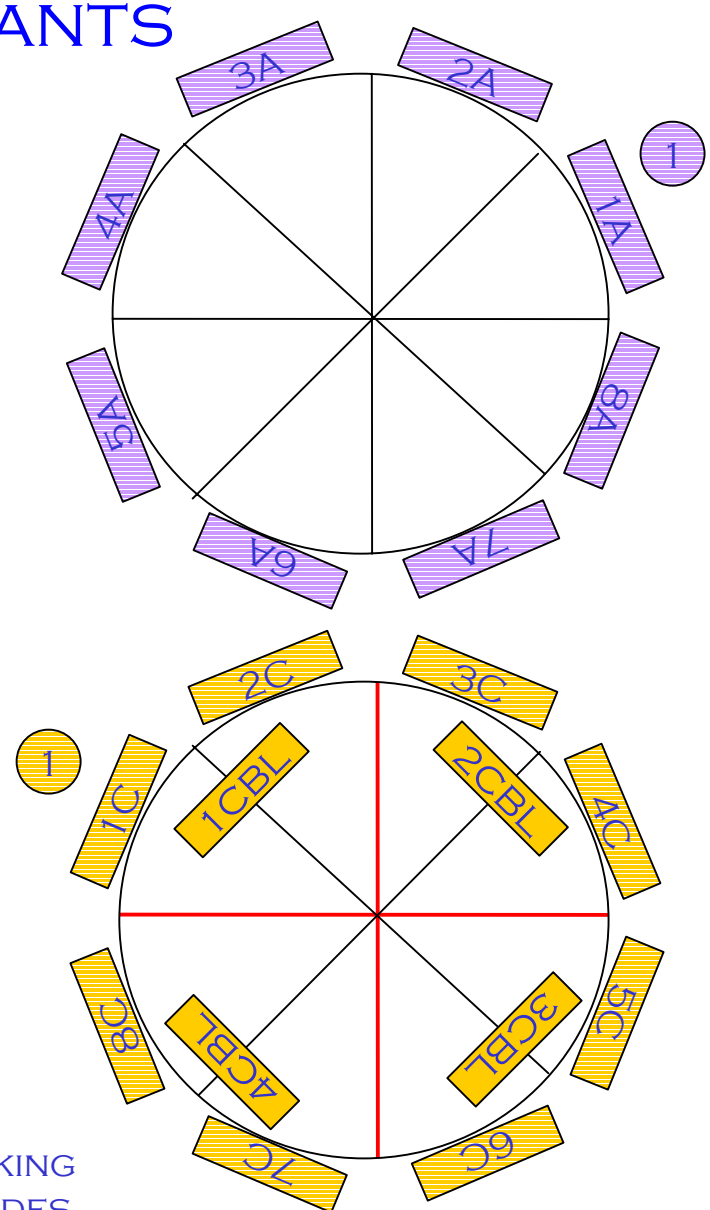
Services in Octants

Needs update for new stave count (90)

	Patch Panel Octant Name	Barrel Layers 1&2	Disk	Tube Total	6-Module Bundle	7-Module Bundles	Bundle Total	Staves Serviced	Sectors Serviced
Side A	1A	3	2	5	(3+6)=9	6	15	12	3
	2A	3	1	4	(3+6)=9	6	15	12	3
	3A	3	2	5	(3+5)=8	5	13	10	3
	4A	3	1	4	(3+6)=9	6	15	12	3
	5A	3	2	5	(3+6)=9	6	15	12	3
	6A	2	1	3	(3+5)=8	5	13	10	3
	7A	3	2	5	(3+6)=9	6	15	12	3
	8A	3	1	4	(3+6)=9	6	15	12	3
Side C	1C	3	1	4	(3+5)=8	6	15	10	3
	2C	3	2	5	(3+6)=9	6	15	12	3
	3C	2	1	3	(3+6)=9	5	13	12	3
	4C	3	2	5	(3+6)=9	6	15	12	3
	5C	3	1	4	(3+6)=9	6	15	12	3
	6C	3	2	5	(3+5)=8	5	13	10	3
	7C	3	1	4	(3+6)=9	6	15	12	3
	8C	3	2	5	(3+6)=9	6	15	12	3
Side C B-Layer	1CBL			2	4	4	8	4	
	2CBL			3	6	6	12	6	
	3CBL			3	6	6	12	6	
	4CBL			3	6	6	12	6	



Numbering scheme for each side looking At IP from that side–position# coincides Physically across ATLAS.

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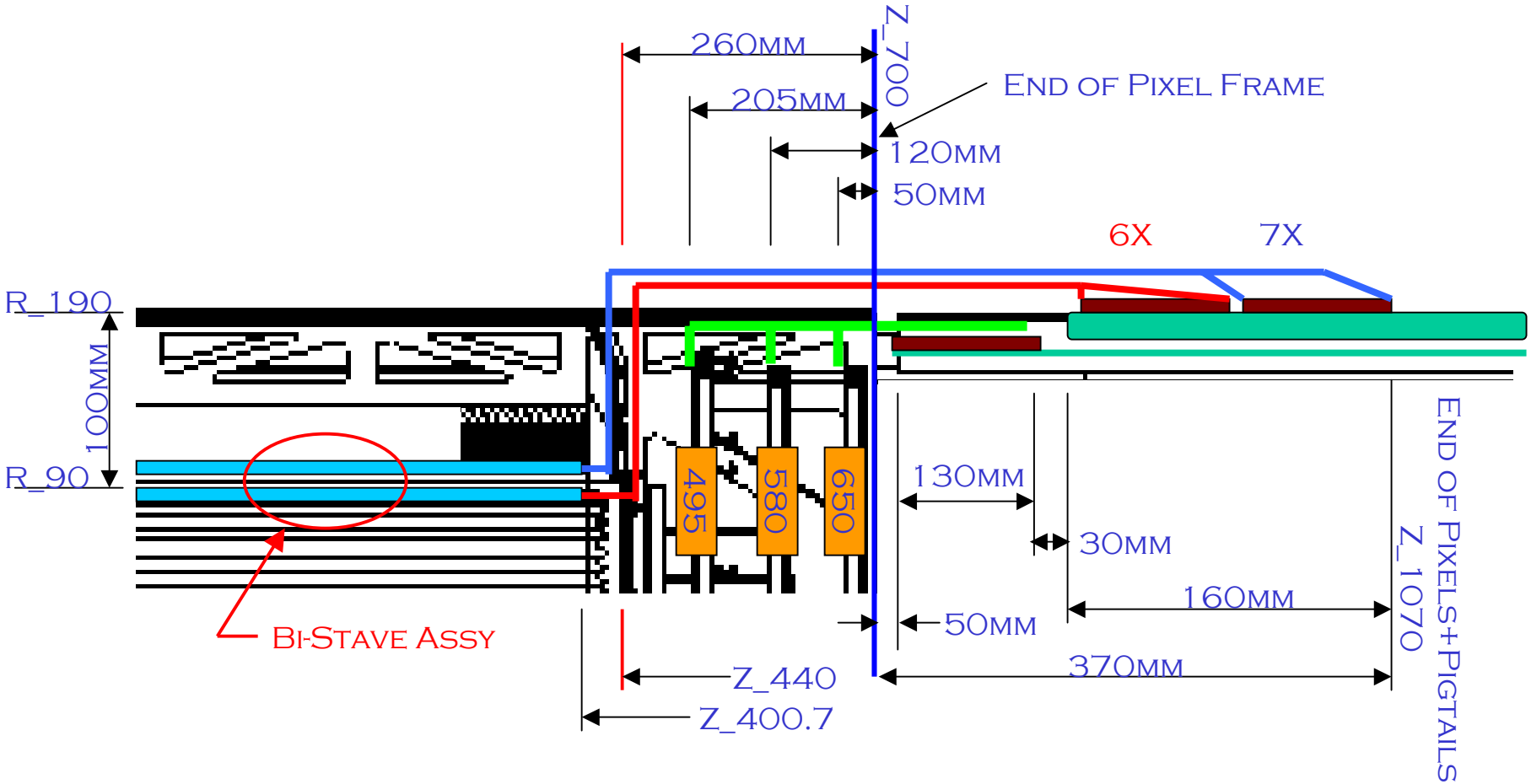
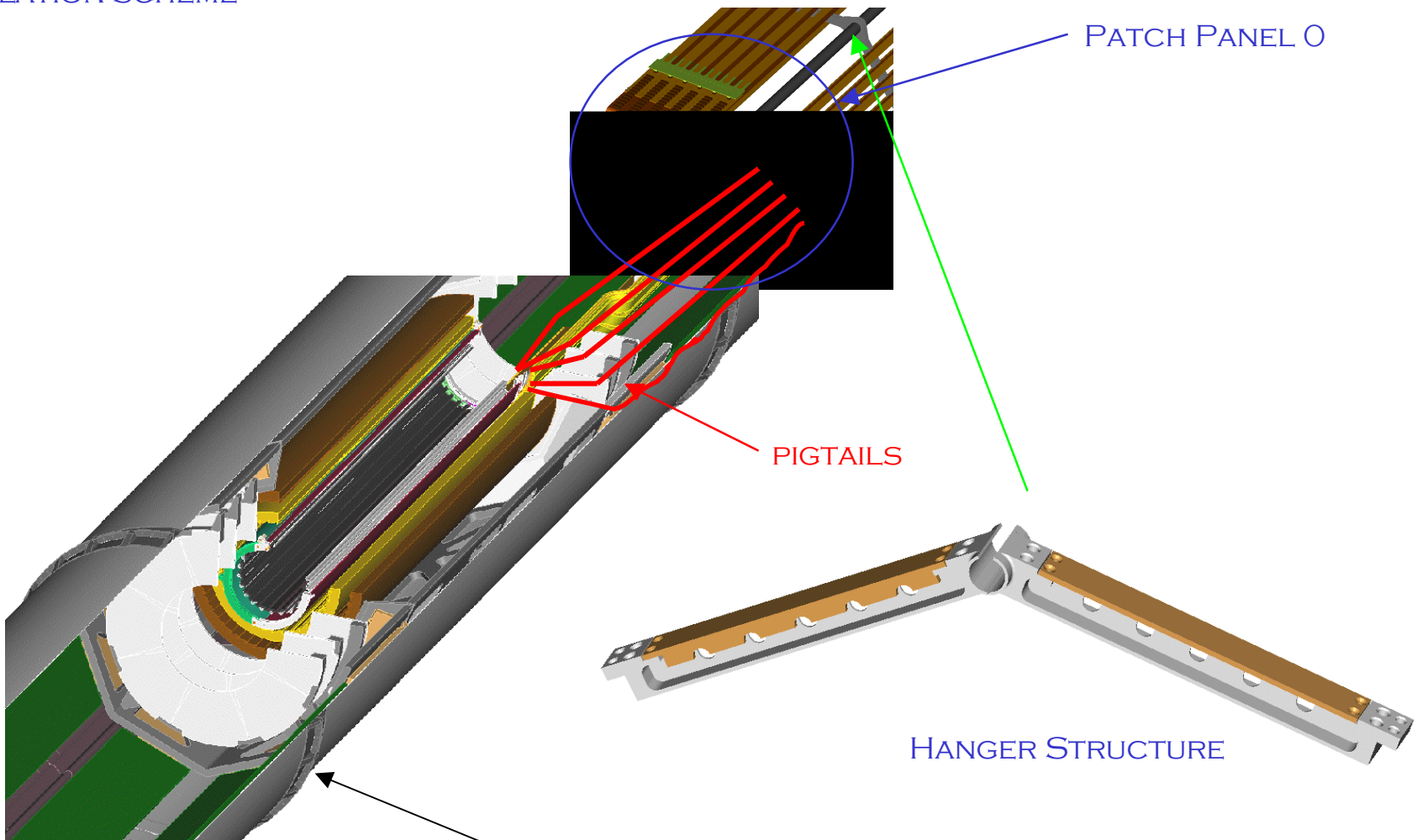
Overlap Region (PP0)



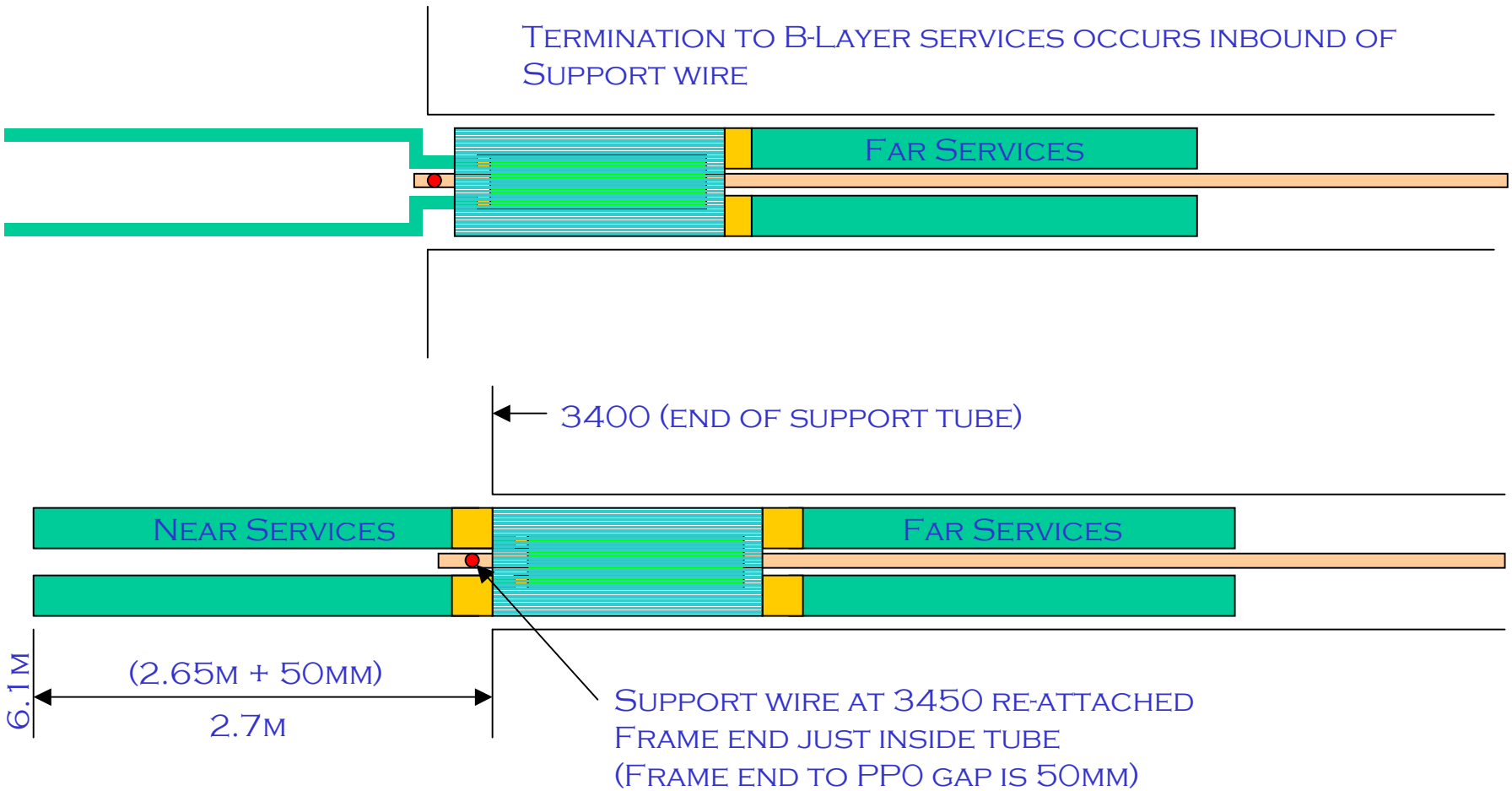
- **Radius of PP0 is approximately 180mm**
- **Starts at Z=750 and goes to Z=1070 (50mm gap between PP0 and Frame)**
- **End of Support Tube is at Z=3400mm, making the Type I panel 2.65m long**

Services Mechanical Support

Structure necessary to support services during installation scheme



Pixel Near Side Service Termination



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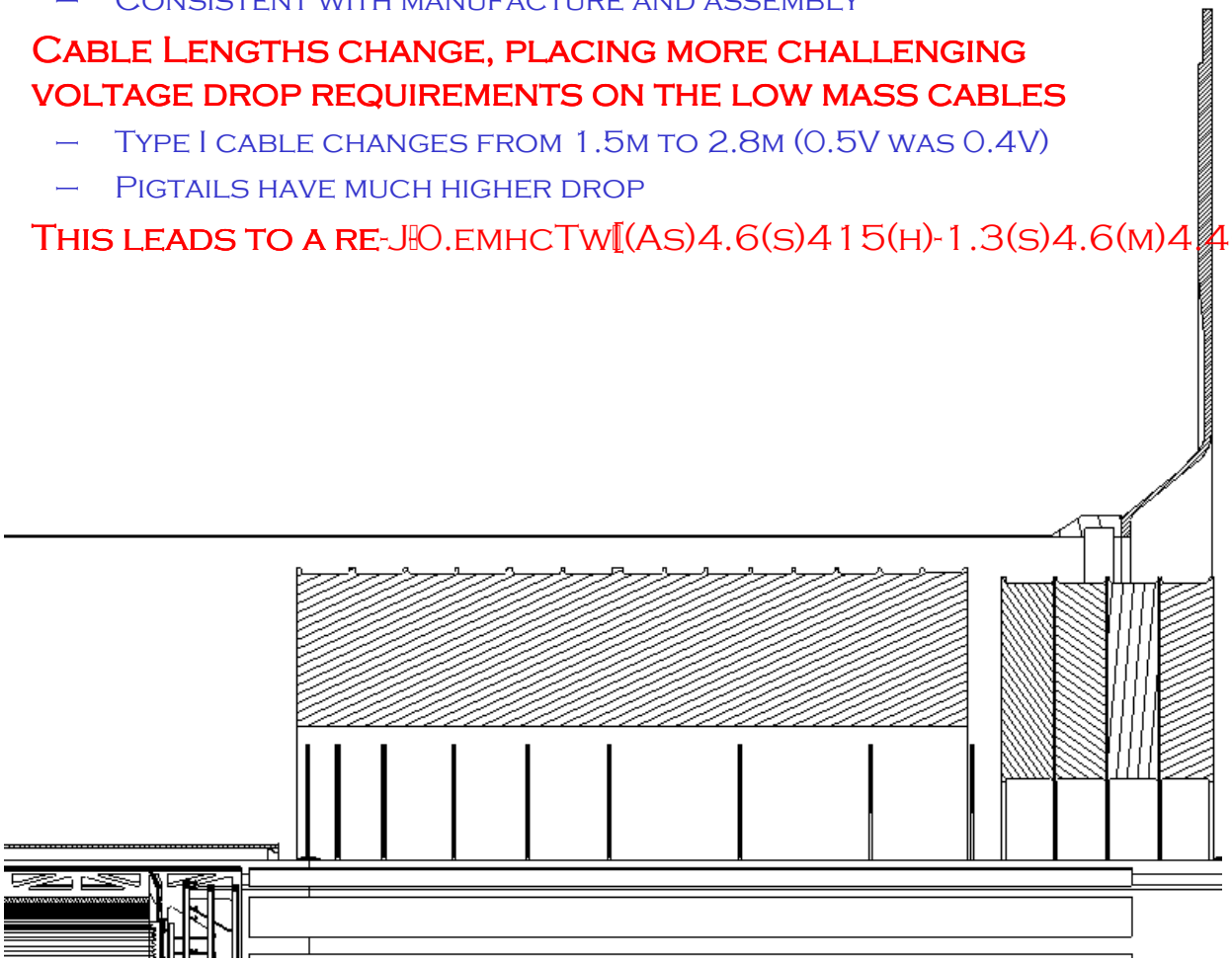
- Assembly order requires breaks at new locations
  - Consistent with manufacture and assembly
- Cable Lengths change, placing more challenging voltage drop requirements on the low mass cables
  - Type I cable changes from 1.5m to 2.8m (0.5V was 0.4V)
  - Pigtails have much higher drop
- This leads to a re-J0.emhcTw[(As)4.6(s)415(h)-1.3(s)4.6(m)4.4(s)4.7(o)80.4ao7(ref)7.(s)th n



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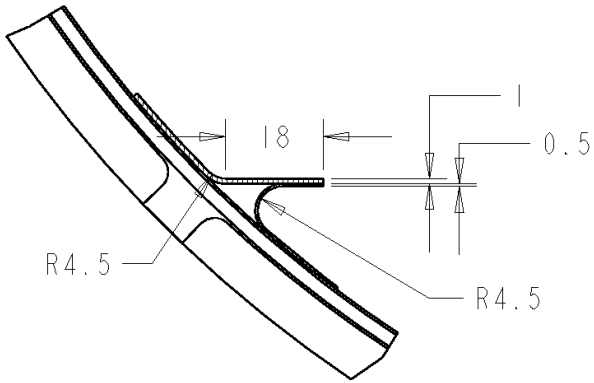
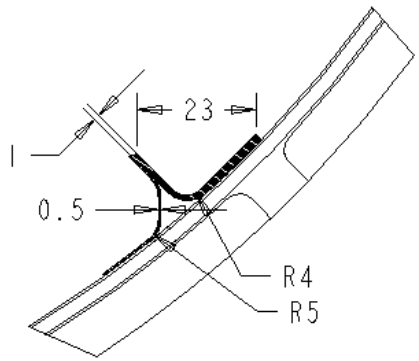
Rail Design in Support Tube



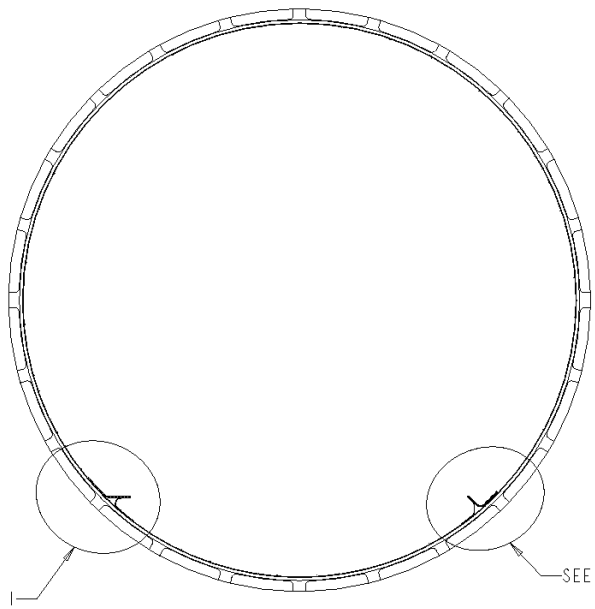
DETAIL 1



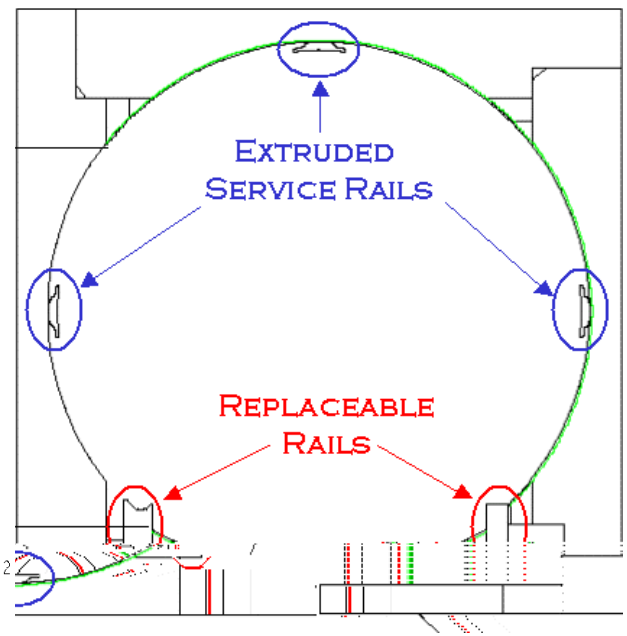
DETAIL 2

Vee and Flat rails were chosen to provide pseudo-kinematic support for the detector during delivery to the support points

Rails are used only for delivery, not support



SECTION A-A
SCALE 0.375



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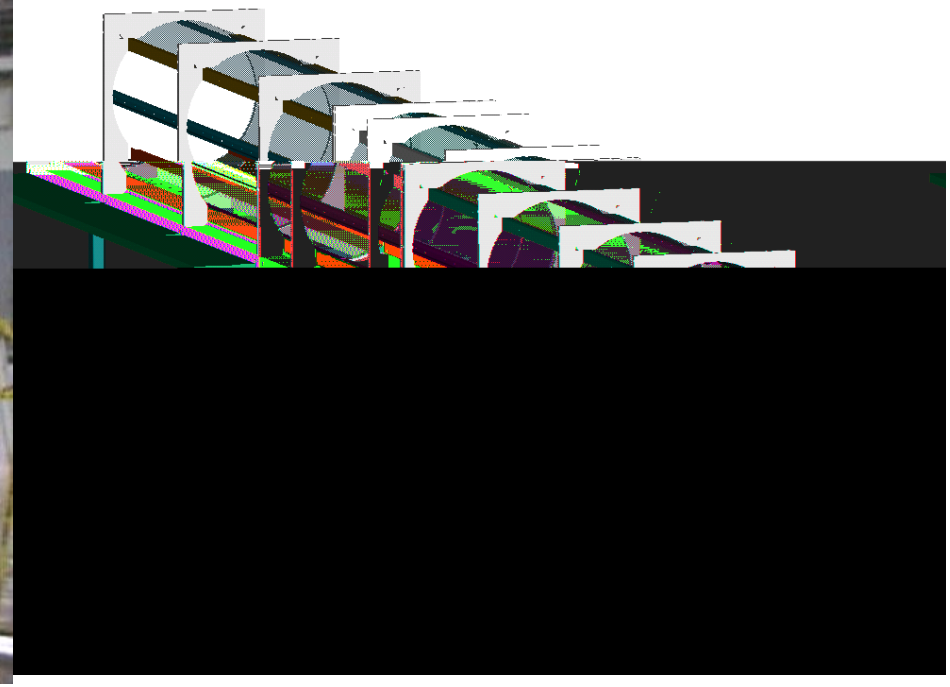
Pixel Support Tube Mockup



- **Sufficient space acquired in old Bevatron Generator Room**
  - Enough space to simulate entire assembly sequence
  - Even possible to do this on scaffolding if so desired (don't desire to)
- **Mockup in three pieces to simulate independent parts of tube**
  - Goal is for full length of entire tube to simulate all installation scenarios
  - Detector rails are removable, should modification be necessary

Pixel Frame and Service Mockup

- **Scope**
  - Mass and Envelope Geometry of final detector Frame
    - Attempting for similar friction as well
  - At least two full quadrants of "Dummy-Dummy" service panels
    - Initially 1-quadrant, both sides, eventually half of all services (are more needed?)
  - At least two octants (both sides) of mechanically accurate connections
    - Needed for installation simulation
  - At least one octant of electrically active service connections
    - This is to provide verification that terminations stay terminated through procedure
    - Might prove useful for thermal mockup
  - Provision for Dummy B-Layer installation
    - Requires also mechanical connections for installation simulation

Mockup Status and Planning

- **Plan to have completed both Tube and Pixel/Service mockups by end of March**
  - Machining is critical path, but is currently on schedule
- **Initial testing of insertion complete by mid April**
  - Intended to be complete for April meeting
  - Allows inclusion of results in June CDR of Pixel Tube and Global supports
- **Milestones**
  - April
    - Frame and Dummy-Dummy services
  - June-Aug
    - Electrically active testing/thermal simulation
  - Oct-02
    - Mechanical testing of Assembly procedures
- **Follow-up**
  - Space is acquired–heating may not be
  - Fabrication
    - Materials are in the shop, machining Started
    - Extrusion order placed
  - Pixel Frame and Service Panel mockup
    - Mass tally has begun
    - Target mockup materials to get close to correct mass